IJAHSP
The Internet Journal of Allied Health Sciences and Practice
http://ijahsp.nova.edu

A Peer Reviewed Publication of the College of Allied Health & Nursing at Nova Southeastern University
*Dedicated to allied health professional practice and education*
**http://ijahsp.nova.edu Vol. 9 No. 2 ISSN 1540-580X**

# Longitudinal Assessment of Emotional Intelligence in Doctor of Physical Therapy Students

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**CITATION:** Lewis, E. Longitudinal Assessment of Emotional Intelligence in Doctor of Physical Therapy Students. *The Internet Journal of Allied Health Sciences and Practice.* April 2011. Volume 9 Number 2.

**ABSTRACT**

**Background and Purpose.** Emotional intelligence has been shown to predict clinical performance in other medical fields and may be a predictor for clinical performance in physical therapy students. Longitudinal assessment of emotional intelligence of Doctor of Physical Therapy students was obtained yearly (three times) beginning in the first year. In addition, the relationship between emotional intelligence and performance on the National Physical Therapy Examination (NPTE) and clinical performance (using the Clinical Performance Instrument (CPI)) was examined. **Participants.** Graduate physical therapy students ($n$ = 260; 218 women and 42 men) between the ages of 20 and 35 from four schools participated. **Methods.** Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT™ version 2.0) scores, Graduate Record Exam (GRE) scores, pre-requisite and professional grade point averages (GPAs), NPTE scores, CPI scores (Version 4), and demographic information were collected. **Results.** Correlation between emotional intelligence and CPI (at either assessment period) was $r \leq 0.37$ and emotional intelligence and the NPTE was $r = 0.25$. Correlation between the various GPA scores and CPI scores was $r \leq 0.13$. Likewise, CPI scores or NPTE scores could not be predicted using regression analyses with any combination of emotional intelligence scores, GPA scores, and GRE scores. Higher total emotional intelligence was observed in those who passed the NPTE (103.3) versus those who failed (97.7) the examination ($p = 0.05$). No differences in total emotional intelligence or any of the subscales were observed over time. **Discussion and Conclusion.** Emotional intelligence may be a factor in passing the NPTE but had little predictive ability in assessing NPTE or CPI performance**.** Moreover, GPA and GRE scores also failed to predict CPI or NPTE, indicating a predictive instrument of clinical performance is still needed.

## INTRODUCTION

Emotional intelligence is an important characteristic or ability that is related to success in the workplace, clinical performance in health professionals, and academic performance of college students. Business executives with higher emotional intelligence lead departments that are 127% more productive compared to those with lower emotional intelligence.[1] Emotional intelligence has been defined as "the ability to monitor one's own and others' feelings and emotions, to discriminate between them, and to use the information to guide one's thinking and actions."[2] It is a construct that includes a "set of skills people use to read, understand, and respond intelligently to the emotional signals sent to them by others."[3] With regard to the medical field, higher emotional intelligence has been shown to be a critical component for success in the clinical aptitude of medical, dental, and nursing students.[3-5] Furthermore, it has been recommended that nursing students possess a high level of emotional intelligence as a pre-requisite for admission to nursing programs.[6] Beyond success in nursing education programs or medical schools, emotional intelligence has been shown to be important in the medical field of employed professionals. Codier et al found that clinical staff nurses with higher emotional intelligence had higher nursing performance evaluations, longer careers, and greater job retention.[7] Physicians' happiness level, a subscale of emotional intelligence, was related to their patients' satisfaction.[8]

There are very few studies on the emotional intelligence of physical therapy students. In the limited research published, there was little correlation between emotional intelligence and clinical or academic performance of physical therapy students.[9,10] One of these two cited studies showed a low correlation between cognitive intelligence (using the Wonderlic Personnel Test) and academic performance as measured by grade point average (GPA).[9] The other study showed no relationship between emotional intelligence and success on the Clinical Performance Instrument (CPI) in graduate physical therapy programs.[10] The CPI is an ability-based psychometric evaluation used by a clinical instructor to rate a physical therapy student's clinical performance. Lack of a significant relationship between emotional intelligence and CPI scores could have occurred for a variety of reasons as previously reported.[10] While it is possible that emotional intelligence is not actually important in the physical therapy field, this explanation seems unlikely given the positive correlations reported in other medical fields between emotional intelligence and various aspects of clinical practice.

Another explanation cited in the previous study was that emotional intelligence was not related to CPI because there was little variation in scores.[10] In addition, emotional intelligence was not assessed at the same time as the CPI assessment.[10] This second explanation for lack of significant findings would be especially important if emotional intelligence changes over time. There is some evidence that emotional intelligence may improve.[11,12] Research by Bar-On has shown as people age, their emotional intelligence increases.[13] However, learning new skills such as increasing emotional intelligence takes specialized training, practice, and feedback as well as readiness of the individual to change.[2,6] It is likely that these physical therapy programs do not provide specialized training in their curriculums for increasing emotional intelligence specifically. Larin et al. measured emotional intelligence longitudinally in physical therapy students and found that by the end of the first academic year, emotional intelligence did not significantly change.[14] However, they found that while emotional intelligence ability of students in a Problem Based Learning program increased slightly, there was a slight decrease in emotional intelligence of students in a traditional program.[14] Since the Larin et al study only examined emotional intelligence within the first year, the lack of significant results may be because of minimal clinical experience obtained and the short time period of observation within the program. Both of these reasons may be the cause of emotional intelligence not being fully developed or nurtured. Currently, no studies have investigated whether there is a change in emotional intelligence throughout the entire duration of the physical therapy program.

Student retention continues to be an issue in the physical therapy field and other health professional programs as a result of the increasing need for skilled health professionals.[6] The overall number of students attending higher educational programs has increased, and some professional programs are admitting students with "non-standard" entry requirements. The increased demand combined with the preparedness of students for physical therapy programs has created a greater need to address retention issues.[6] Physical therapy programs do not want to lower standards for admission to or graduation from physical therapy programs. At the same time, colleges and university programs are interested in attracting and retaining the students who will eventually become the best clinicians. The debate over what screening tools are most appropriate to achieve this goal has not been resolved. Undergraduate GPA and graduate record exam (GRE) scores have been shown to be poor predictors of clinical performance.[15,16] Interviews were also found to have no correlation to clinical performance.[17] At the present time, it appears there is no reliable and valid instrument that can predict clinical performance.[15-17] While the aforementioned study did not show that emotional intelligence was related to CPI scores for physical therapy students, this study sought to improve upon the design of that study by examining emotional intelligence in the same timeframe as the CPI assessment.[10]

Physical therapy students need the cognitive ability, psychomotor skills, and affective behavior skills required during their didactic and laboratory classes and clinical rotations to successfully pass their program. Once the program has been completed successfully, the student must pass the National Physical Therapy Examination (NPTE) in order to obtain a license to practice. The NPTE has been used as a measure of success. This study examined the relationship between emotional intelligence and performance on the NPTE. This longitudinal study also examined emotional intelligence scores of Doctor of Physical Therapy students each year during the duration of the program.

**PURPOSE**

The specific goals of this study were to examine whether emotional intelligence changes over time during the three-year Doctor of Physical Therapy program and to assess the relationship of emotional intelligence to the physical therapy CPI and NPTE performance. The following research questions were addressed:

1. Does emotional intelligence of physical therapy students change over the course of the three-year Doctor of Physical Therapy program?
2. Is emotional intelligence of physical therapy graduate students related to specific items on the CPI and total CPI scores?
3. Is emotional intelligence of physical therapy students related to performance on the NPTE?

## METHODS

### Participants

Two hundred and sixty students (218 women and 42 men) between the ages of 20 and 35, currently enrolled in four accredited university or college programs participated in the study. Men were older than women 24.9 ± vs. 23.5 ± years ($p$ = 0.05). All participants were enrolled in the beginning of their academic program for a Doctor of Physical Therapy degree. The inclusion criteria for this study were that they were first-year students in the program and had a pre-requisite GPA on file.

### Instruments

The emotional intelligence test utilized in this study was the Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT™) - Version 2.0.[18] The MSCEIT™ test is a reliable psychometric instrument.[19] The overall reliability of the MSCEIT™ is r = 0.93 for general consensus scoring.[20] The test-retest reliability is r =0.86.[21, 22] Barchard found the MSCEIT™ (Version 1.1) to have good internal consistency.[23] This test was chosen over the self-report tests that ask personal questions which participants may not answer truthfully.[13] Schutte et al. found the MSCEIT™ to be one of the most comprehensive assessments of emotional intelligence compared to other instruments (e.g., Bar-On Emotional Quotient Inventory, Toronto Alexithymia Scale, the Trait Meta Mood Scale, and Cooper and Sawaf's model of emotional intelligence) that assess individual components of emotional intelligence.[21,24-27] The MSCEIT™ was process-oriented and "emphasized the stages of development, potential for growth, and the contributions that emotions make to intellectual growth".[21] The "Total Score" is made up of two area scores: "Experiential" and "Reasoning (Strategic)." The area scores can be further subdivided into four branch scores. The Experiential area score is composed of: Branch 1, Perceiving Emotions, the ability to "identify emotions within oneself and others" and Branch 2, Facilitating Thinking, how well one can use one's own emotions to improve thinking.[18] The Reasoning area score is composed of: Branch 3, Understanding Emotions, the degree one understands "the complexities of emotional meanings, emotional transitions, and emotional situations" and Branch 4, Emotional Management, how well one can manage emotions in their own life and in others.[18]

After each participant completed the survey on-line, the MSCEIT™ was scored by the publisher, Multi-Health Systems, Inc. (North Tonawanda, NY) and the results were then forwarded to the principal investigator via a secure e-mail. The MSCEIT™ score was calculated using Multi-Health Systems, Inc.'s software that used the general consensus method as recommended by the developers of the MSCEIT™ test.[18] General consensus refers to the answer that is considered correct by the majority of people.[18] No corrections for age, gender, or ethnicity were performed while scoring. Standardized scoring was used with 100 being defined as the average score and a standard deviation of 15 representing one standardized deviation. The highest possible score was 167.

### Procedure

Students from eight classes (two classes X four schools) were briefed on the nature and purpose of the study. To maintain consistency across schools during the recruitment process, a standardized briefing was given to potential participants at each school. Students were admitted into the study after signing the Institutional Review Board (IRB) approved informed consent form. Students could choose to complete and return the forms to enroll or simply return blank forms to indicate they choose not to enroll. The procedure of returning the forms (even if blank) gave the appearance of having enrolled and could have alleviated pressure from peer groups, professors, or researcher. As part of the briefing, students were assured that participating (or not participating) in the research project was voluntary, and their relationship with the school and the researcher would not be impacted. The students were further assured that confidentiality would be maintained and that they could choose to sign up in a given year without past or future commitment. The students were also informed that they could withdraw at any time if they changed their mind later. Demographic data (age, gender, and school) were collected via written survey from the students on the same day of the briefing. Each participant received a packet of information which included a cover letter explaining the study and instructions for completing the online emotional intelligence test within two weeks at their convenience. A randomly assigned identification number was assigned to each volunteer to ensure confidentiality of the data.

Participants were sent e-mail reminders to take the online test. Of the 260 participants enrolled 87 of the participants completed the emotional intelligence test all three times. The emotional intelligence test scores were collected at the very beginning of the program (EI1), at the beginning of the second year of the program (EI2) and at the end of the third academic year (EI3). The principal investigator obtained the pre-requisite GPAs, professional GPAs, GRE, and CPI scores directly from the school administrators. The professional GPAs were collected at two time points in the program: after the first year of the program (GPA Yr1) and after the third year of the program (GPA Yr3). CPI scores were collected at two time points during the program after the first clinical rotation of six weeks or longer (CPI 1), which was at the end of the first year, and after the final rotation (CPI 2) in the third year. The NPTE was taken three to six months after graduation. The NPTE score was collected from either the school or the individual. Pre-requisite GPA was calculated for a specific set of classes (ranging from 8-14 classes) that are determined by

each graduate physical therapy program. Pre-requisite and professional GPAs were based on a 4.0 scale. The CPI instrument used was version 4 with 24 items. The clinical instructors record a slash mark along a VAS that is 10 cm in length and represents a continuum from novice clinician (left margin) to expert (right margin). The distance of the slash mark from the left border was measured by hand in centimeters and multiplied by 10 to represent the score out of 100 possible on each of the 24 items. For example, an 8 cm slash would translate into a score of 80. The passing score on the NPTE is 600 with a maximum of 800 possible. The NPTE is a 200-question online national licensure examination for the physical therapy profession created and administered by the Federation of State Boards of Physical Therapy.[28] Questions are developed based on practice patterns. The examination is tested for validity every five years to ensure that the question content reflects the job requirements.[29] The test reliability had an average Kuder-Richardson 20 (KR-20) score of r = 0.80. This is a relatively reliable measure of internal consistency of the exam based on consistency of items that attempt to measure the same construct. The KR-20 is a similar measure to Cronbach's alpha except that it is limited in measuring dichotomous choices on a test. Although licensure examinations cannot test all abilities, the NPTE has been considered reliable since 2002.[28] Data were collected for this study during the academic years of 2005-2009.

**Data Analysis**

Data were analyzed using SPSS Version 15 Software (SPSS Inc., Chicago, IL). Descriptive statistics are reported as mean $\pm$ standard deviation (S.D.). Repeated measures analyses of variance (ANOVAs) were used to examine possible changes in various emotional intelligence parameters and academic performance (e.g., CPI scores) over time. Bonferoni's adjustments were made to account for multiple analyses to minimize the risk of committing a Type I error. Some scattered differences in various measures existed between schools but these differences disappeared after adjusting for the number of analyses. No consistent pattern existed such as one school showing significantly better performance on a particular test (CPI scores, NPTE scores, GPA scores, and emotional intelligence scores); therefore, aggregate data was used. Likewise, there were no differences between men and women except for age so all analyses included both men and women. Pearson product-moment ($r$) correlations were used to determine if there was a correlation between various emotional intelligence measures, academic performance (e.g., pre-requisite GPA, and professional GPA) and NPTE scores. Non-repeated measures ANOVA was used to determine if there were differences on any measures between those who passed the NPTE versus those that did not. Differences between schools and between men and women were also examined by non-repeated measures ANOVAs. Level of significance was set at $p < 0.05$ for all tests. When level of significance was achieved for various ANOVA tests, Least Significant Difference (LSD) *post hoc* tests were used to determine the location of the differences.

**RESULTS**

Emotional intelligence did not differ significantly over time (Table 1) for the Experiential or Reasoning areas or the Total Emotional Intelligence Score ($p \geq 0.19$). Examining changes in CPI scores over time (Table 2) showed that all CPI item scores showed significant improvement at the second assessment compared to the first assessment ($p \leq 0.01$) even with a Bonferroni adjustment made for multiple analyses ($n = 24$ CPI analyses) except for CPI 17. Due to missing data for CPI 17, only 14 pairs of scores were analyzed. CPI 17 rates the student on the ability to "provide consultation to individuals, businesses, schools, government agencies or other organizations". Most often the opportunity to observe this behavior during clinical rotation does not occur.

**Table 1. Emotional intelligence scores (Mean $\pm$ S.D.) over time ($n = 87$).**

| Emotional Intelligence Measure | Year 1 | Year 2 | Year 3 |
|---|---|---|---|
| Experiential Area | 101.2 $\pm$ 13.7 | 102.6 $\pm$ 14.8 | 100.7 $\pm$ 14.9 |
| Reasoning Area | 102.6 $\pm$ 7.6 | 103.5 $\pm$ 6.7 | 104.1 $\pm$ 7.6 |
| Total Score | 102.7 $\pm$ 10.1 | 104.2 $\pm$ 10.9 | 103.2 $\pm$ 11.6 |

**Table 2. CPI scores (Mean ± S.D.) over time (*n* = 87).**

| CPI Area | Year 1 | Year 2 |
|---|---|---|
| CPI 1 (*n* = 59) | 91.0 ± 14.0 | 99.4 ± 2.9 |
| CPI 2 (*n* = 59) | 91.4 ± 20.2 | 99.5 ± 2.7 |
| CPI 3 (*n* = 58) | 94.8 ± 7.4 | 95.4 ± 2.9 |
| CPI 4 (*n* = 57) | 92.6 ± 11.2 | 99.5 ± 2.7 |
| CPI 5 (*n* = 58) | 93.9 ± 8.7 | 99.4 ± 3.0 |
| CPI 6 (*n* = 59) | 86.5 ± 11.5 | 98.9 ± 3.7 |
| CPI 7 (*n* = 59) | 84.5 ± 11.4 | 99.1 ± 3.3 |
| CPI 8 (*n* = 59) | 89.5 ± 11.7 | 99.4 ± 2.7 |
| CPI 9 (*n* = 59) | 80.7 ± 14.5 | 98.6 ± 3.8 |
| CPI 10 (*n* = 38) | 80.4 ± 14.3 | 99.2 ± 3.3 |
| CPI 11 (*n* = 59) | 77.9 ± 13.5 | 98.8 ± 3.8 |
| CPI 12 (*n* = 59) | 76.8 ± 14.1 | 99.0 ± 3.6 |
| CPI 13 (*n* = 58) | 78.7 ± 13.6 | 99.0 ± 3.9 |
| CPI 14 (*n* = 58) | 83.5 ± 13.1 | 99.1 ± 3.4 |
| CPI 15 (*n* = 59) | 83.1 ± 13.8 | 99.0 ± 3.6 |
| CPI 16 (*n* = 51) | 75.7 ± 21.5 | 97.9 ± 5.9 |
| CPI 17 (*n* = 14) | 70.7 ± 22.6 | 94.6 ± 13.5 |
| CPI 18 (*n* = 46) | 72.8 ± 17.7 | 97.6 ± 8.2 |
| CPI 19 (*n* = 59) | 82.8 ± 15.2 | 98.8 ± 3.7 |
| CPI 20 (*n* = 52) | 82.4 ± 13.8 | 99.0 ± 4.4 |
| CPI 21 (*n* = 54) | 79.8 ± 16.9 | 98.7 ± 5.6 |
| CPI 22 (*n* = 58) | 85.4 ± 17.4 | 99.7 ± 1.0 |
| CPI 23 (*n* = 56) | 86.6 ± 15.3 | 99.4 ± 1.9 |
| CPI 24 (*n* = 37) | 81.0 ± 16.9 | 98.5 ± 4.4 |

There was only little to fair relationship ($r \leq 0.37$) using the correlation coefficient interpretation offered by Portney and Watkins between any of the emotional intelligence scores and performance on the CPI (at either assessment period).[31] No correlation existed between any of the emotional intelligence scores and the NPTE licensure examination score. Correlations between NPTE score and Pre-requisite GPA ($r = 0.32$), Year 1 GPA ($r = 0.42$), and Year 3 GPA ($r = 0.34$) showed weak but significant correlations ($p \leq 0.001$). Correlation between the various GPA scores and CPI scores was $r \leq 0.13$. Likewise, CPI scores or NPTE scores could not be predicted using regression analyses with any combination of emotional intelligence scores, GPA scores, and GRE scores.

Some differences between emotional intelligence scores assessed during the first year and whether the individual passed the NPTE did exist. A total of 151 individuals were assessed for their emotional intelligence scores during their first year. Of these, fourteen participants failed the NPTE the first time they took it. Table 3 illustrates the various emotional intelligence scores of those who passed the examination versus those that did not with level of significance of the difference indicated. Branch 1 and Total Emotional Intelligence Scores showed significant differences between groups ($p \leq 0.05$) but there was a consistent trend for all emotional intelligence measures to be greater in those who passed the examination compared to those who failed. A limitation of this analysis was that only 14 of 151 participants in this sample actually failed the NPTE. Furthermore, the analysis was limited to examining differences in emotional intelligence scores of the first year of those who passed the NPTE versus those that did not. The reason for this was many participants in the second and third year chose not to complete the emotional intelligence test thus limiting the statistical power for determining differences between those who passed the NPTE versus those that did not. For example, in Year 2 there were 137 participants that passed and 7 who failed, while in Year 3 there were 125 participants that passed and only 4 who failed. Ideally, if there were no participant withdrawal then examining emotional intelligence in the third year should be compared to the NPTE since the NPTE is taken after the third year. However, since emotional intelligence showed no longitudinal differences, it seems reasonable to use the ANOVA analysis from Year 1 where there were the most participants in both groups (pass vs. fail the NPTE) to determine differences between groups.

**Table 3. Emotional intelligence scores (Mean ± S.D.) of those who passed versus those who failed the Licensure Examination (NPTE).**

| Emotional Intelligence Measure | Passed ($n$ = 137) | Failed ($n$ = 14) | Significance |
|---|---|---|---|
| Experiential Area | 102.3 ± 13.8 | 96.2 ± 14.4 | 0.12 |
| Branch 1 | 103.0 ± 13.9 | 95.1 ± 13.1 | 0.04* |
| Branch 2 | 101.1 ± 13.3 | 99.8 ± 15.3 | 0.72 |
| Reasoning Area | 102.6 ± 7.6 | 98.8 ± 4.9 | 0.07 |
| Branch 3 | 102.2 ± 8.7 | 99.2 ± 9.1 | 0.22 |
| Branch 4 | 100.9 ± 6.9 | 99.1 ± 7.1 | 0.34 |
| Total Score | 103.3 ± 10.2 | 97.7 ± 10.0 | 0.05* |

Values less than $p \leq 0.05$ indicated with *

## DISCUSSION

In the previous study, emotional intelligence was not shown to be related to clinical performance.[10] A number of reasons were cited that indicated a change in experimental design might detect a significant relationship. In this study, emotional intelligence was assessed three times over the three-year program. During this study, the student's emotional intelligence was assessed at approximately the same time that the CPIs were completed and as close as possible to when the NPTE tests were taken.

These results suggest that emotional intelligence may play a role in the ability to pass the NPTE. Differences in emotional intelligence of those who passed versus those that did not showed significant differences in Branch 1 and the Total Score. Additionally, all other emotional intelligence test subscales were higher in those who passed the examination versus those that did not. These results suggest that emotional intelligence may be an important trait for physical therapy professionals similar to medical students, doctors, and nurses.[4,7,8]

Some debate as highlighted by Dulewicz and Higgs has existed on whether emotional intelligence is a state (unchanging) or trait (changing) characteristic.[32] Some researchers, e.g., Goleman, believe that it is a developable trait or competency.[33] However, Mayer et al. and others believe that it is an ability that one possesses.[34] As noted, within the psychological literature there are differences of opinion at what stage within a person's life emotional intelligence is developed or changes can take place.[34] The evidence suggests that changes to emotional intelligence in childhood are effective with appropriate interventions or training, but there is doubt about changes later in life.[35]

Emotional intelligence did not change over the course of the physical therapy programs. This is despite the fact that students were progressing through the program successfully and may have been exposed to training that could enhance emotional intelligence if it were a state characteristic. These findings are similar to the study by Larin et al that found no overall change in emotional intelligence during the first year of the physical therapy program.[14] If emotional intelligence was able to be modified, this lack of change may be due to the short duration of time required to complete the program. If one accepts the premise emotional intelligence can change in adulthood, then the process to change may take several years. Another reason for these findings may be that the students were concentrating on their academic studies rather than interpersonal skills or factors that may improve emotional intelligence. These results are similar to findings by Thieman et al in a study on 122 Master of Physical Therapy students who found that grade point averages, along with GRE scores and prior grades, could only predict 11% variability in NPTE performance.[16] However, the results of Dockter's study demonstrated a significant moderate correlation between first year GPA and NPTE scores ($r = 0.65$, $p < 0.05$).[35]

Similar to the previous study, there was also no relationship between emotional intelligence and CPI scores.[10] However, these findings are in contrast to the findings of Stratton et al that found various components of emotional intelligence ability related to clinical skills of medical students.[4] Perhaps this difference is due to the different emotional intelligence instruments used. Stratton used the Trait Meta Mood Scale which may be a more appropriate instrument to detect important components of emotional intelligence within the medical field.

Attrition occurred on this longitudinal study. Some participants enrolled in the study and completed all three of the MSCEIT™ tests, while others only completed one or two of the three assessments. In addition, not all of the students enrolled. Some participants enrolled in the study but then did not complete the MSCEIT™, citing a busy schedule as the reason for dropping out of the study. It is possible that the students that were not performing well in a demanding program were less likely to volunteer to complete the study. The likelihood of this was not tracked due to confidentiality reasons. It is likely that not all of the students that eventually failed out of the programs were captured in this study. It would be most desirable to capture the data of those students

that fail out of the program by offering a larger incentive than this study provided.

## CONCLUSIONS

Differences were observed between those who passed versus those who did not pass the NPTE. However, emotional intelligence could not predict NPTE performance. Emotional intelligence and GPAs and GREs were not found to be predictors of performance on the CPI. Like the previous study, this study did not capture students' data after they failed the program or those who applied to the program but who were not admitted.[10] While screening instruments are sought that can predict success in clinical ability, the ability to assess emotional intelligence in poor performers such as those who actually fail a program is difficult to achieve for the above stated methodological reasons. In order to capture data for failing students, an incentive or creative procedure will likely be required. Although there were small differences in emotional intelligence between those who passed the NPTE versus those that did not, there were only weak or non-predictive capabilities of emotional intelligence on the CPI or NPTE scores. GRE and undergraduate GPAs were similarly non-predictive. Hence, there continues to be a need to develop or discover instruments that can predict clinical performance of physical therapy students.

## ACKNOWLEDGEMENTS

The author thanks Keith Hallbourg, PT, DPT, MS, as well as staff and faculty at the four schools for assistance with data collection. Thanks to all of the physical therapy students that volunteered their time to be in the study.

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